

aem qualification pack

Materials for anion-exchange membrane (AEM) water electrolysis: AionFLX™ membranes and ionomers, OXYGN and H2GN catalysts and electrodes, HYScale stacks – plus OXYGN-M for ultra-low-iridium PEM.

Product overview · recommended qualification protocol · specification summary

one matched materials system

CENmat develops the key materials of AEM water electrolysis as one system: a PFAS-free membrane and a matching ionomer from the same material family, and anode and cathode catalysts free of platinum-group metals and critical raw materials. Qualifying them together shortens matching work between membrane, catalyst layer and binder – one supplier instead of three.

AEM MEMBRANES

AionFLX™ anion-exchange membranes

PFAS-free anion-exchange membranes for AEM electrolyzers; wet or dry assembly.

> 8,000

h*

AionFLX™ Plus composite membrane: continuous operation in a long-term test; < 10 $\mu\text{V/h}$ degradation rate after the first 2,300 h

* 50 °C, 1 M KOH

$\approx$ 5,000

h*

long-term test at $\approx$ 20 $\mu\text{V/h}$ degradation

* 50 °C, 0.1 M KOH

< 5 $\mu\text{V/h}^*$

degradation in a 330 h short-term test

* 50 °C, 0.1 M KOH

AEM IONOMERS AND BINDERS

AionFLX™ ionomers

Matched PFAS-free binder for AEM catalyst layers, electrodes and inks.

2.07 V*

at 2 A/cm², large-area cell

* 0.1 M KOH

> 98 %*

Faradaic efficiency

* 0.1 M KOH

PFAS-free

same material family as the membrane

CRM-FREE ANODES FOR AEM

OXYGEN catalysts and electrodes (AEM)

CRM-free oxygen-evolution catalyst and coated anodes.

2.01 V*

at 2 A/cm² in full cell

* 50 °C, 0.1 M KOH

400 cm²

coated electrodes, validated

PGM-free

no platinum-group metals

CRM-FREE CATHODES FOR AEM

H2GN catalysts and electrodes

CRM-free hydrogen-evolution catalyst and coated cathodes for AEM cells.

2.01 V*

at 2 A/cm² in full cell

* 50 °C, 0.1 M KOH

6 kW

short stack validated

PGM-free

no platinum-group metals

AEM STACKS AND SYSTEMS

HYScale AEM electrolyser stacks and systems

CRM-free AEM stacks on CENmat materials: 6 kW short stack validated; 100 kW system: production completed · in commissioning.

6 kW

short stack validated

100 kW

system: production completed · in commissioning

0.5–1 MW

scalable stack architecture

ULTRA-LOW-IRIDIUM PEM ANODES

OXYGN (PEM) ultra-low-iridium catalysts and CCMs

OXYGN-M ultra-low-iridium PEM anode catalyst and CCMs; 1.86 V at 2 A/cm² for > 1,000 h with 0.2 mg Ir/cm².

0.2 mg

Ir/cm²*

1.86 V at 2 A/cm² and > 1,000 h without degradation in

1.86 V*

at 2 A/cm², 0.2 mg Ir/cm²

* 80 °C

> 1,000 h*

at 2 A/cm² without degradation, 0.2 mg Ir/cm²

* 80 °C

recommended qualification protocol

A practical starting point for qualifying the matched set (AionFLX™ membrane + ionomer, OXYGN anode, H2GN cathode) in your own hardware. CENmat's reference results are measured at 50 °C in 0.1 M KOH. Values below are suggestions; we agree the final protocol with you before samples ship.

- 1 Define the test case**
Cell or stack format and active area, electrolyte (KOH concentration), temperature, pressure, target current density and acceptance criteria. Share them with CENmat so we can recommend grade and format.
- 2 Receive and store**
Keep materials sealed, dry and at room temperature until use. Record batch IDs of membrane, ionomer and electrodes for traceability.
- 3 Assemble**
Follow the handling notes supplied with the datasheet (membrane conditioning, wet or dry assembly). Use the porous transport layers and compression recommended in the datasheet for your cell hardware.
- 4 Condition (break-in)**
Heat to operating temperature with electrolyte circulating, then ramp current stepwise to your nominal load and hold until the cell voltage is stable. Record the break-in curve.
- 5 Polarisation curve**
Galvanostatic steps from low current to at least 2 A/cm², recorded at stable voltage, following the EU harmonised polarisation-curve test method for low-temperature water electrolysis (JRC). Report temperature, electrolyte and active area with each curve.
- 6 Impedance**
EIS at a low and at the nominal current density to separate ohmic (HFR), kinetic and transport losses.
- 7 Durability**
Constant-current hold at the nominal current density (CENmat reference: 0.1 M KOH, 50 °C) for at least 300 h. Report the degradation rate in μV/h over a stated time window. Optional: dynamic cycling between 0.5 and 2 A/cm².
- 8 Gas purity**
Hydrogen-in-oxygen at low and nominal load, since crossover is highest at low current.
- 9 Review**
Share polarisation, EIS and durability data with CENmat. We review results together and agree formats, volumes and lead times for the next step.

This protocol is guidance for customer qualification, not a warranty of performance. Results depend on cell hardware, electrodes, PTLs and operating conditions.

specification summary

AionFLX™ anion-exchange membranes AEM membranes

PARAMETER	VALUE	CONDITIONS
Material	PFAS-free; membrane and ionomer from the same material family	–
Nominal thickness	≈ 80 µm (dry)	–
Sheet size	Validated up to 900 cm ²	–
Cell performance	2.01 V at 2 A/cm ² *	* 50 °C, 0.1 M KOH
Degradation (330 h short-term test)	< 5 µV/h over 330 h*	* 50 °C, 0.1 M KOH
Long-term test	≈ 5,000 h at ≈ 20 µV/h*	* 50 °C, 0.1 M KOH
Durability in 2 M KOH	18 µV/h over ≈ 2,100 h*	* 2 M KOH
Assembly	Wet or dry	–
Ion-exchange capacity (IEC)	1.1 meq/g	–
OH ⁻ conductivity	82.7 mS/cm*	* 50 °C, 1 M KOH
Swelling ratio	20 %	–
Gas crossover (H ₂ in O ₂)	≈ 0.2 vol % at 1.3 A/cm ² *	* 50 °C, 0.1 M KOH

AionFLX™ ionomers AEM ionomers and binders

PARAMETER	VALUE	CONDITIONS
Material	PFAS-free anion-conducting ionomer, same material family as the AionFLX™ membrane	–
Use	Binder in AEM catalyst layers and CENmat CRM-free electrodes	–
Cell performance	2.01 V at 2 A/cm ² *	* 50 °C, 0.1 M KOH
Large-area cell	2.07 V at 2 A/cm ² *	* 0.1 M KOH
Faradaic efficiency	> 98 %*	* 0.1 M KOH

OXYGN catalysts and electrodes (AEM) CRM-free anodes for AEM

PARAMETER	VALUE	CONDITIONS
Catalyst type	Oxygen evolution (OER); free of platinum-group metals and critical raw materials	–
Formats	Powder; catalyst-coated substrates up to 20 × 20 cm	–
Cell performance	2.01 V at 2 A/cm ² *	* 50 °C, 0.1 M KOH

H2GN catalysts and electrodes CRM-free cathodes for AEM

PARAMETER	VALUE	CONDITIONS
Catalyst type	Hydrogen evolution (HER); free of platinum-group metals and critical raw materials	–
Formats	Powder; catalyst-coated substrates up to 400 cm ²	–
Cell performance	2.01 V at 2 A/cm ² *	* 50 °C, 0.1 M KOH
Degradation (330 h short-term test)	< 5 µV/h over 330 h*	* 50 °C, 0.1 M KOH
Scale-up	Validated at 400 cm ² and in a 6 kW short stack	–

HYScale AEM electrolyser stacks and systems AEM stacks and systems

PARAMETER	VALUE
Technology	AEM water electrolysis with PFAS-free AionFLX™ membranes and CRM-free OXYGN/H2GN electrodes in dilute KOH
Cell active area	400 cm ² (6 kW short stack) · 900 cm ² (100 kW system)
Validated	6 kW short stack; same performance in single cell and stack
Short-stack testing	4-cell stack with stable stack voltage
100 kW system	Production completed · in commissioning
Current density at 2 V	2 A/cm ²
System CAPEX	< 400 €/kW
Scale	Architecture designed to scale to 0.5–1 MW
Efficiency (kWh/kg)	Published after 100 kW acceptance testing

OXYGN (PEM) ultra-low-iridium catalysts and CCMs Ultra-low-iridium PEM anodes

PARAMETER	VALUE	CONDITIONS
Catalyst	OXYGN-M ultra-low-iridium catalyst	–
Performance at 0.2 mg Ir/cm ²	1.86 V at 2 A/cm ² *	* 80 °C
Durability at 0.2 mg Ir/cm ²	> 1,000 h at 2 A/cm ² without degradation*	* 80 °C
Supply forms	Catalyst powder and catalyst-coated membranes (CCMs)	–

* Test conditions. Performance depends on cell hardware and operating conditions.

next steps

Request samples

Paid sample sets of membrane, ionomer and coated electrodes, sized for your cell. Prices on request.

cen-mat.com/samples/

Get a quote

For volumes, short stacks and pilots. Select several products at once; membrane, ionomer and electrodes can be quoted as one materials pack.

cen-mat.com/contact/#quote

Datasheets

Full datasheets with test conditions and handling notes are sent personally by our team.

cen-mat.com/datasheets/

EU research projects

CENmat coordinates the Horizon Europe project HYScale (grant 101112055) and is a partner in REDHY, SWEETHY, NEWELY and PROMET-H2.

cen-mat.com/eu-projects/

CENmat · Cutting-Edge Nanomaterials UG (haftungsbeschränkt) · info@cen-mat.com. Company details: cen-mat.com/legal-notice/.
Information subject to change; performance depends on operating conditions.